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Applicants respectfully submit that the claims are not obvious over Miller et al. in view of Marzocchi et al. for at least the following reasons:

A. Miller et al. and Marzocchi et al. relate to different fields of endeavor.

Therefore, it would not be obvious to combine the teachings of the two patents. Miller et al. relates to roof coverings whereas Marzocchi et al. relates to a composition for road paving and repair. There is no mention of roof coverings in Marzocchi et al., e.g., no mention at column 2, lines 10-20 as stated in the Office Action. The two fields are significantly different from one another in the requirements for the materials used. Teachings related to road paving and repair are not obviously applicable to roof coverings.

B. Marzocchi et al. relates to glass flakes whereas Miller et al. relates to substrates such as nonwoven glass fiber mats. Teachings related to glass flakes, which are discrete particles (milled or ground glass), are not obviously applicable to nonwoven mats (which are made from elongate fibers). In fact, Marzocchi specifically teaches away from using glass fibers or glass mats, and instead teaches making an asphalt/glass flake matrix. As described in the background of Marzocchi et al (Col. 2, lines 13-52), glass mats were not effective in this field:

Glass fibers, due to their high tensile strength, high modulus, and low cost, have been used extensively in the reinforcement of resins, rubber, and asphalts. Pavement applications such as roads, driveways and bridges and walks, although having received considerable attention, have met with varying degrees of technical success but no extensively accepted commercial products. Bridge decking reinforcement has been tried with a woven ten feet by twenty feet continuous glass fiber scrim fabric in two layers which are combined to reinforce a membrane composed of pitch, aromatic oils, plasticized vinyl resins, and an inert talc filler. ... This technique, however, did not prevent cracks from propagating from the bottom layer up through the top surface as a reflection cracking. One of the causes of failure resulted from the tremendous sheer forces at the interface, that is, the forces applying from the wear surface to the substrate through the interface. Failure was also accentuated during compression of the surface layer by vehicular traffic. Problems encountered

also were due to stress concentration at the interface accompanied by a concentration of stress resulting from a movement of the aggregate in the surface layer which on compression from vehicular traffic would actually cut the glass yarn underneath, accentuated by vehicular traffic causing compression of the surface layer which in turn gradually causes a flow of the asphalt which tends to concentrate toward the top layer and leaving the aggregate accentuated on the bottom of the layer and assisting in puncturing of the interface that may have been applied.

Conversely, Marzocchi et al teach that glass flakes are useful in an asphalt matrix, as opposed to a mat (substrate) to act more in a compressive state, or more like a filler material, and not providing tear strength as claimed (ref Marzocchi col. 4, lines 54-55 and col. 5, lines 16-29).

The intermixture of flake glass particles provides interparticle reinforcement.

The addition of glass flakes having a small diameter or size which is non-uniform will act as a reinforcement by introducing a high modulus material to the matrix substances restricting flow and compression. In systems which are filled with coarse fillers such as sand or gravel the glass flakes will release the modulus of interfiller particle asphalt bridges. Because of the high flat surface area, the glass flake contributes to the development of an inorganic barrier against permeation by liquid or gases, thus resulting in less damage to substrate or matrix materials, for example, water freeze and thaw cycling, oxidation, ozone degradation, rusting, and the like. The glass surface also adsorbs low molecular weight oils, further immobilizing the asphalt.

This is further amplified in Marzocchi at Col 7, line 65-col 8, line 23.

A preferred reinforcement for asphaltic compositions are very short milled fibers either by hammer or ball mill. Previous attempts to reinforce asphaltic compositions with chopped or milled fibers have been counterproductive as the high modulus fibers have excellent memory and will tend to return to linear shape in soft matrices such as asphalt, causing increased void content and general decrease in strength properties. Fibers maintain a filament nature where the length is about 100 times or more than the diameter. In samples of composites when subjected to compression, the long glass fibers are deformed, and when compression is relieved, these fiber will tend to return to straight configuration and cause voids and loosening of the mix. However, with the addition in the mix of large aggregate of 1/2" average diameter or more, this tendency is diminished or even eliminated. Accordingly, it is preferable to use very short filamentized glass fibers to produce the asphaltic compositions with improved strength. Final maximum length should preferably average less than 1/64 inch or 0.01 inch or even less. For highly filled asphaltic compositions such as asphalt concrete, the ranges of microfiber of the foregoing type based upon total composition weight are approximately 0.12 to 2.0 with a preferred

range from 0.3 to 1.5%. For non-filled systems such ranges are 0.1 to 90% with a preferred range of 1 to 10%.

As such, one reading Marzocchi et al would not be motivated to apply these teachings to long fibers or to a glass mat, nor to roofing products, since a teaching related to the adhesion of glass flakes is not obviously applicable to the adhesion of nonwoven mats, especially when the use of fibers or mats is discouraged in Marzocchi.

C. There is no suggestion in Miller et al. of any need to improve the adhesion between the substrate and the asphalt. The substrate in Miller et al. is saturated with asphalt and coated on both sides with asphalt, and Miller indicates (Col 1, line 21) that "The typical roofing material construction is suitable under most circumstances." This structure suggests that the substrate is adhering sufficiently to the asphalt, since the substrate is permeated by and surrounded by asphalt. There is no suggestion that the substrate is not adhering sufficiently to the asphalt such that there would be a need for the materials disclosed in Marzocchi et al., but instead Miller seeks to improve impact performance of the overall shingle.

In fact, Miller teaches away from the instant invention. While the instant invention seeks to improve the substrate properties, Miller et al abandons any effort to improve the substrate and instead Miller adds an additional mat to improve the mechanical properties of the shingle.

D. There is no suggestion in Marzocchi et al. that the use of their materials would improve tear strength as recited in the present claims. Marzocchi et al. teaches the use of glass flake as a filler/reinforcement for an asphalt matrix in a paving application; and Marzocchi seeks to achieve better adhesion of the glass flake in the asphalt matrix.

As noted in Marzocchi et al at Col 8, lines 56-60

The glass flake that is described for use in FIGS. 1 to 6 as a reinforcement for the asphaltic compositions may be surface treated to chemically alter the glass so that chemical bonding may occur between the glass surface and the asphaltic matrix resin.

Since the glass flakes are discrete particles, in contrast to the substrate of the present invention, tear strength is not an issue in Marzocchi et al. – which, being a paving material, is seeking to improve compressive resistance of the matrix through adhesion of the glass to the asphalt matrix, not tear strength. Improved tear strength is the main purpose of the present invention, and it is recited in the claims, whereas Marzocchi et al. does not even address tear strength. Accordingly, there is no motivation to make the claimed invention.

E. Addition of the Marzocchi et al. materials would not improve the tear strength of the Miller et al. roofing material. The Miller et al. roofing material includes a web bonded to the bottom surface of the roofing material. For example, a preferred web is a thermoplastic polymer web. The Miller et al. web will greatly increase the tear strength of the roofing material because the web is very difficult to tear compared to a conventional roofing material without such a web. Thus, it would be useless to add the Marzocchi et al. materials to the roofing material of Miller et al. to improve the tear strength, because the addition of the materials would not improve the tear strength above the improvement provided by the web. The improved tear strength is the main purpose of the present invention, and it is recited in the claims, whereas a combination of Miller et al. and Marzocchi et al. does not even address tear strength.

II. 35 U.S.C. 103(a) Rejections over Miller et al. in view of Marzocchi et al., and further in view of Williams et al.

Claims 2, 9-15, 17-21 and 23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al. in view of Marzocchi et al., and further in view of Williams et al. (US 4210459). Independent claim 9 reads as follows:

- "9. A roof covering comprising:
- a roofing mat formed from fibers of a fiber material, the fibers coated with a sizing; and
 - an asphalt-based coating material that coats the mat, the coating material containing added sulfur ;

the sizing including a bonding material that bonds to the fiber material and that bonds to the sulfur; and

the sulfur forming cross-links with the asphalt;

wherein the tear strength of the roof covering is increased by at least about 5% as measured by ASTM D 1922 compared to the same roof covering without the bonding material in the sizing and the sulfur added to the coating material."

Applicants respectfully submit that the claims are not obvious over Miller et al. in view of Marzocchi et al., and further in view of Williams et al., for at least the following reasons:

A. Miller et al. and Williams et al. relate to different fields of endeavor.

Therefore, it would not be obvious to combine the teachings of the two patents. Miller et al. relates to asphalt-based roof coverings, and the present claims are directed to asphalt-based roof coverings, whereas Williams et al. relates to polymer composite articles. Composite articles are significantly different from roof coverings, and asphalt materials are significantly different from polymer materials. Thus, the fields of the two inventions are significantly different from one another. Teachings related to polymer composite articles are not obviously applicable to asphalt-based roof coverings.

B. There is no suggestion in Miller et al. of any need to improve the adhesion between the substrate and the asphalt. Williams et al. teaches that their coupling agent improves the adhesion between the substrate and the polymer. In contrast, there is no suggestion of any need for improved adhesion in Miller et al. The substrate in Miller et al. is saturated with asphalt and coated on both sides with asphalt. This structure suggests that the substrate is adhering sufficiently to the asphalt, since the substrate is permeated by and surrounded by asphalt. There is no suggestion that the substrate is not adhering sufficiently to the asphalt such that there would be a need for the Williams et al. coupling agent.

The Office Action states that it would have been obvious to use the Williams et al. coupling agent in the Miller et al. roofing material in order to simplify the coating of the glass fibers to one chemical treatment and to improve the strength of the resin phase. Applicants respectfully disagree that these motivations could be reasonably applied to the Miller et al. roofing material. Miller et al. does not mention chemical

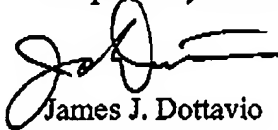
treatment of the substrate, and Miller et al. (and the present claims) relate to an asphalt-based material, not a resin material.

C. There is no suggestion in Williams et al. that the use of their materials would improve tear strength as recited in the present claims. Williams et al. teaches improved adhesion. In contrast to roofing materials, tear strength is not an issue with a polymer composite material. The improved tear strength is the main purpose of the present invention, and it is recited in the claims, whereas Williams et al. does not even address tear strength.

D. Addition of the Williams et al. coupling agent would not improve the tear strength of the Miller et al. roofing material. The Miller et al. roofing material includes a web bonded to the bottom surface of the roofing material. For example, a preferred web is a thermoplastic polymer web. The Miller et al. web will greatly increase the tear strength of the roofing material because the web is very difficult to tear compared to a conventional roofing material without such a web. Thus, it would be useless to add the Williams et al. coupling agent to the roofing material of Miller et al. to improve the tear strength, because the addition of the coupling agent would not improve the tear strength above the improvement provided by the web. The improved tear strength is the main purpose of the present invention, and it is recited in the claims, whereas a combination of Miller et al. and Williams et al. does not even address tear strength.

In view of the above remarks, Applicants respectfully submit that the claimed invention is patentable over the prior art. If any questions should arise with respect to the remarks, or if it would in any way expedite the prosecution of this patent application, it is requested that the Examiner contact Applicants' attorney.

Respectfully submitted,



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